

REMARKS

Favorable reconsideration of this application in light of the following discussion is respectfully requested.

Claims 1-9 are currently pending in the present application.

In the outstanding Office Action, Claims 1 and 5-7 were rejected under 35 U.S.C. 102(e) as anticipated by U.S. Publication No. 2004/0061978 to Kawato; and Claims 2-4, 8, and 9 were rejected under 35 U.S.C. 103(a) as unpatentable over Kawato in view of U.S. Patent No. 6,707,084 to Katti et al. (hereinafter “Katti”).

Addressing now the rejection of Claims 1 and 5-7 under 35 U.S.C. 102(e) as anticipated by U.S. Pub. No. 2004/0061978 to Kawato, that rejection is respectfully traversed.

Though they are different in scope, each of independent Claims 1 and 7 recites “a tunnel barrier layer of antiferromagnetic material formed between the magnetization pinned layer of ferromagnetic material and the emitter or between the collector and the magnetization pinned layer of ferromagnetic material and provided with an exchange coupling with the adjoining magnetization pinned layer of ferromagnetic material, the magnetization of the magnetization pinned layer of ferromagnetic material being fixed by the exchange coupling between the magnetization pinned layer of ferromagnetic material and the tunnel barrier of antiferromagnetic material.” The remaining claims depend from Claims 1 and 7.

The outstanding Office Action cites Kawato’s antiferromagnetic (AFM) layer 41a as teaching the claimed tunnel barrier layer. However, as the AFM layer 41a is made entirely of a highly conductive metal, i.e., IrMn,¹ one skilled in the art would not reasonably conclude

¹ Kawato, col. 5, para. 51.

that the AFM layer 41a teaches a tunnel barrier layer. Thus, the claimed “tunnel barrier of antiferromagnetic material” distinguishes over Kawato’s AFM metal layer 41a.

Applicants’ disclosure notes at least one advantage of not employing an AFM metal layer, stating, “Without inserting the AFM metal layer into the Base, the spin-tunnel transistor of the present embodiment can prevent the reduction of the collector current and MR ratio.”² The advantage of not employing an AFM metal layer suggests that the claimed tunnel barrier not only distinguishes over Kawato’s AFM layer 41a, but also is not obvious in view of Kawato’s AFM layer 41a.

Accordingly, for the above-stated reasons, Applicants respectfully request that the rejection of Claims 1 and 5-7 under 35 U.S.C. 102(e) as anticipated by Kawato be withdrawn.

Addressing now the rejection of Claims 2-4, 8, and 9 under 35 U.S.C. 103(a), that rejection is respectfully traversed.

The outstanding Office Action cites Katti’s AFM layer 504 as teaching the claimed tunner barrier layer; and asserts, “It would it have been obvious ... to modify the device of Kawato by incorporating a non-magnetic layer in contact with the tunnel barrier layer to adjust or select the amount of coupling between the AFM layer and the soft layer (ferromagnetic layer).”³

Respectfully, even assuming *arguendo* the above assertion were correct, the assertion would only suggest the inclusion of a non-magnetic layer in contact with Kawato’s AFM layer 41a. Thus, if the incorporated non-magnetic layer were also a dielectric, the above assertion would only suggest the further recited features of Claim 3; and would not suggest the further recited features of Claims 2, 4, 8, and 9. Moreoever, as the assertion would not suggest a substitution of Katti’s AFM layer 504 for Kawato’s AFM layer 41a, the resulting

² Applicants’ specification, page 11, lines 13-15.

³ Office Action, 3/23/2005, page 4.

combination of Kawato and Katti would not teach the claimed turned barrier layer for the reasons stated with respect to base Claims 1 and 7.

Further, even assuming *arguendo* the above assertion were correct, the invention of Claim 3 would still patentably define over the resulting combination. Claim 3 recites “a dielectric layer of nonmagnetic material formed in contact with the tunnel barrier layer of antiferromagnetic material.” By employing a non-magnetic insulator and AFM layer between the claimed emitter and base, the dielectric strength voltage is enhanced and the stability of the spin-tunnel transistor is thereby improved. Thus, the advantage of employing a non-magnetic insulator and AFM layer between the claimed emitter and base suggests that such a feature is not obvious in view of Katti.

Accordingly, for the above-stated reasons, Applicants submit that Katti does not cure the deficiencies of Kawato; and submit that Claims 2-6, 8, and 9 further patentably over the proposed combination of those references.

Consequently, in light of the above discussion and in view of the present amendment, the present application is believed to be in condition for allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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